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ABSTRACT

At the request of General Electric-Utica (GE), the State University of New York Institute of Technology at Utica/Rome and the Mohawk Valley Regional Education Center for Economic Development have developed a program to train GE software development personnel. GE is involved in the development of aerospace electronic equipment and related software for the federal government. Based on the assumption that the ability to design standardized software packages efficiently enhances the company's competitiveness and may allow it to continue as a major manufacturer in the region, the training program is designed to train employees on GE's newly acquired state-of-the-art workstations and in structured analysis and design methodology as applied to real-time systems. The university's training and professional development center worked with GE management personnel and the college's computer science faculty to develop a 50-hour training program. Course evaluations have been positive, and the program is seen to have been effective in increasing the company's position in the aerospace electronics market. (Author/MSE)

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PROJECT TITLE:	GE - Structured Analysis and Design Training
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AASCU/ERIC Model Programs Inventory Project

The AASCU/ERIC Model Programs Inventory is a two-year project seeking to establish and test a model system for collecting and disseminating information on model programs at AASCU-member institutions--375 of the public four-year colleges and universities in the United States.

The four objectives of the project are:

- To increase the information on model programs available to all institutions through the ERIC system
- To encourage the use of the ERIC system by AASCU institutions
- To improve AASCU's ability to know about, and share information on, activities at member institutions, and
- To test a model for collaboration with ERIC that other national organizations might adopt.

The AASCU/ERIC Model Programs Inventory Project is funded with a grant from the Fund for the Improvement of Postsecondary Education to the American Association of State Colleges and Universities, in collaboration with the ERIC Clearinghouse on Higher Education at The George Washington University.

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ABSTRACT

At the request of General Electric - Utica, New York (GE), the State University of New York (SUNY) Institute of Technology at Utica/Rome and the Mohawk Valley Regional Education Center for Economic Development have developed a program to train GE software development personnel. GE-Utica is involved in the design and manufacture of aerospace electronic equipment for the United States Government. As the aerospace industry depends on technology that is constantly changing, in order to stay competitive in a shrinking defense market, it is imperative that employees be exposed to the latest technological developments.

Software is a major component of aerospace electronic equipment. In order to produce aerospace electronic equipment competitively, GE software engineers must be able to design and produce complicated software programs quickly and efficiently. In addition, all software designers must follow the same standardized procedures so that software packages can be combined and interchanged.

In order to upgrade and streamline software production, GE-Utica purchased state-of-the-art SUN Workstations. The training program is designed to train employees on the new equipment and to bring them up-to-speed in structured analysis and design methodology as applied to real-time systems. By reducing software production time, GE will become more competitive in the aerospace industry and will hopefully be able to continue as a major manufacturer in the Mohawk Valley.

SUNY's Center for Training and Professional Development (CTPD) worked with GE management personnel and the college's computer science faculty to develop a 50-hour training program. CTPD applied for funding through a grant from the New York State Department of Economic Development for $24,000. The grant was approved in September, classes began October 5, 1989, and will continue through June 30, 1990.

INTRODUCTION

In a joint effort between the Mohawk Valley Regional Education Center for Economic Development, the State University of New York (SUNY) Institute of Technology at Utica/Rome, and General Electric - Utica, New York (GE) a training course for GE software development personnel was developed. The focus of the course was on the structured analysis and design methodology as applied to real-time systems on the SUN workstation.

This report describes the need for the SUN workstation training, the parties involved in planning and managing the course, the funding source, the goals and objectives, and a summary of the evaluation data from the first section of the course.

BACKGROUND

General Electric-Utica (GE), which employs approximately 3,000 area residents and is involved in the design and manufacture of aerospace electronic equipment, requested that SUNY Institute of Technology at Utica/Rome develop a course for its employees on structured analysis and design. Software plays a significant role in aerospace electronic equipment; thus, a training course for software development personnel would make the company more competitive in today's shrinking defense business provided it could streamline the production of software. GE had purchased new state-of-the-art engineering computer SUN workstations expressly to improve competitiveness in the aerospace electronic systems industry. The training was designed to increase its employees' ability to develop new software which will ultimately have a major impact on productivity.

PROGRAM DESCRIPTION

In a three-way collaboration between the Mohawk Valley Regional Education Center for Economic Development, SUNY Institute of Technology at Utica/Rome, and General Electric-Utica a training course on SUN engineering workstations was organized.

The New York State Department of Economic Development funded the 24,000 program by covering the instructor's salary and fringe benefits; textbooks and supplies; and administrative costs incurred by the Center for Training and Professional Development.

The Center for Training and Professional Development at SUNY Institute of Technology at Utica/Rome coordinated the design, development, and delivery of the training for GE by: 1) recruiting and hiring an appropriate instructor; 2) writing the grant for funding; 3) managing the budget; 4) monitoring the course and instructor; 5) preparing and summarizing evaluations from the participants; and 6) submitting the final narrative report upon completion of the project in June, 1990.

General Electric management personnel interviewed several SUNY staff members and selected one who seemed best suited for the position. The instructor, Dr. Bruno Andriamanalimanana, developed a course outline that addressed the specific training needs, and this outline was subsequently approved by GE management personnel. The company also encouraged its employees to attend the classes by allowing partial release time, providing employees with SUN workstations, and making classroom facilities available.

GE's **training** needs resulted from the fact that the aerospace industry is involved in technology that is constantly being challenged, updated, and researched. For that reason, it is imperative that employees involved in the design, development, management, and manufacturing division be exposed to the latest advances and projects in the field.

The course provides in-depth instruction in the structured analysis and design methodology as applied to real-time systems. It focuses on the specification methods of Hatley-Pirbhai and the structured design method of Constantine and others. Processing, control, and timing requirements, as well as data dictionary design, are studied in detail in the first part of the course. The second part explains design strategies and refinement methods. Practical examples are used throughout to provide insight and sharpen applicable skills.

The **target group** for the course is approximately 80 software development personnel. The **goals** set for the individual trainees are to: 1) give them knowledge of structured specification and design terminology, 2) make them more proficient in designing, leveling, and balancing data flow diagrams using the Teamwork CASE software on the SUN workstation, and 3) make them more proficient in designing control flow diagrams using Teamwork. Mastering these goals is expected to have the following impact on the employer: 1) there would be uniform methodology throughout the software engineering division, 2) there would be a smooth transition to CASE (Computer Aided Software Engineering, 3) it would reduce software development time, thus increasing productivity, and 4) competitiveness would be improved.

To accommodate the 80 people who needed the training, the course was divided into four sections as follows:

1) October 5 - November 3, 1989
2) November 9 - December 15, 1989
3) January 29 - February 28, 1990
4) May/June, 1990

Approximately 20 employees are scheduled to attend each course 10 hours per week for 5 weeks. The 50 hours of instruction are divided into 2 class sessions per week -- 5 hours per day. Of the 10 hours spent in class each week, 7 hours are on company time and 3 hours are on personal time.

Additional training is anticipated during the summer and/or fall of 1990 in an effort to provide instruction for additional employees.

RESULTS/EVALUATION PROCESS

Midway through the first 5-week section the instructor, the trainees, and GE management personnel evaluated the presentation of the course. The employees indicated that they have a very busy work schedule and that "taking time away from the job is a tough task." Hence, it was decided that the quantity of "homework" assignments and out-of-class projects would be limited to better meet the needs of the employees.

At the end of each 5-week session, trainees are asked to compete a one-page course evaluation form. Evaluation questions pertaining to course content, instructor expertise, materials used, and meeting facilities are addressed; and each statement is rated on a scale of 1 to 5, with 1 being low and 5 being high. (See attached form.)

Employees in the first 5-week section of the course gave the course an overall course rating of 3.6 out of 5.0. When asked if they acquired new skills or information that they can use in their jobs, all trainees responded with either a 4 or a 5 on the 5-point scale. This indicates that as a result of the course they should all be better able to perform their jobs.

CONCLUSIONS AND RECOMMENDATIONS

Though it is still too early to measure the total effectiveness of this training program, it appears that the program will have a major impact on the competitiveness of GE-Utica in the aerospace electronic market. Both the managers and the trainees at GE feel that the course has helped to bring them up to speed with the latest technology in software design. By streamlining their software production, GE-Utica should be better able to compete in the shrinking defense market and thus continue as a major employer in the Mohawk Valley.